REMARKS

Claims 1 through 7 were presented for examination as amended in the response to the final rejection. Claim 1 was amended to include language to specify that the heat exchanger must be positioned in the gas phase in the reactor.

Claims 1 and 3 through 7 have been rejected under Section 103(a) as being unpatentable over Gibson et al. in view of Hinton et al. Claim 2 has likewise been rejected over the combination of these two references with Reagan. These rejections are respectfully traversed.

The first statement made in the office action is that Gibson discloses a process of polymerization of ethylene in a reactor containing a cobalt complex catalyst, a liquid phase, and a gas phase of which is heat exchanged. This statement is completely incorrect.

The claimed invention is a process for making a linear alpha olefin oligomer in a reactor which must have both a liquid and a gas phase. The process comprises the steps of oligomerizing ethylene in the presence of a catalyst complex, which is selected from the group consisting of nickel, palladium, cobalt, titanium, zirconia, hafnium, vanadium, chromium, molybdenum, and tungsten complexes, to an alpha olefin oligomer in a reaction which involves the release of heat. The heat is removed with a heat exchanger which is not in direct contact with the liquid phase but is positioned in the gas phase and uses at least part of the gas phase as a coolant medium. The liquid reaction medium is required in the present invention. (See page 5, line 17, of the specification). Some reaction may take place in the gas phase but the primary reaction medium is a liquid reaction medium.

It is important that the cooling system have its cooling element outside the liquid reaction medium to avoid the deposit of wax and polyethylene on the heat exchanger.

The Examiner's statement that Gibson describes polymerization in a reactor with a liquid phase and a gas phase is incorrect because Gibson describes only four types of reaction processes for producing ethylene polymers. These are described at page 9, lines 17 and 18 as solution phase, slurry phase, gas phase, or bulk phase. Solution phase polymerization is carried out exactly as is implied, i.e., in solution. Slurry phase polymerization is carried out exactly as is implied, i.e. in a slurry. Gas phase polymerization is carried out exactly as is implied, i.e., in the gas phase. There is nothing in the Gibson reference which suggests or implies that the reaction take place in a reactor which has both a discrete liquid phase where most of the reaction takes place and also a discrete gas phase from which unreacted reaction components and some reaction products can be condensed.

Furthermore, the only specific descriptions of polymerization processes given in Gibson are of slurry and gas phase processes. (See page 10, line 26, through page 12, line 7, for the description of the slurry process.) On page 12, lines 8 and 9, it is stated that in the bulk polymerization process, liquid monomer is used as the polymerization medium so again, this is an entirely liquid phase reaction.

Up to this point in the reference, there is no description or discussion of heat exchange. The only discussion of heat exchange follows this point wherein the description of gas phase polymerization begins (page 12, line 10). Earlier in the prosecution, the Examiner stated that a gas phase reaction must contain liquid. That is incorrect and is entirely inconsistent with the description of the gas phase process in the reference relied upon by the Examiner. At page 12, lines 18-25, the reference defines the gas phase process as the formation of a solid in the polymerization zone directly from a gas and free from liquid. There is no liquid phase reaction medium and no condensation of the gas phase.

The Applicants assert that this reference cannot be combined with the secondary reference, Hinton et al. Hinton clearly teaches a process for the polymerization of conjugated dienes wherein there is a significant liquid phase wherein the reaction takes place and also a significant gas phase. A heat exchanger is placed in the gas phase in order to condense the gas phase and thus cool the liquid reaction medium.

The processes described by Gibson and Hinton are entirely different polymerization processes. The reaction mechanism takes place in a different way because in Gibson, the reaction takes place in a gas phase and in Hinton, the reaction takes place in a liquid phase.

For the reasons set forth above, the Applicants assert that the combination of Gibson and Hinton is improper and that the rejection based thereon should be withdrawn. An early notice of allowance is respectfully requested.

Respectfully submitted,

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